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LISTS OF SPECIES

Observations of the under-described avifauna of the Mostardas Peninsula, Rio Grande do Sul, Brazil

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ABSTRACT: The Mostardas Peninsula on the east coast of Rio Grande do Sul state, Southern Brazil is important for migratory shorebirds that depend upon the wetlands in the Lagoa do Peixe National Park. However, previous surveys have suggested that the Peninsula is bereft of terrestrial birds relative to similar habitat in Rio Grande do Sul. We used rapid assessment methods to evaluate terrestrial bird diversity and note observations of migratory birds at the western margin of Lagoa do Peixe National Park between 11 February 2007 and 25 March 2007. We recorded fourteen species not previously reported for this area, including several new breeding records, and detail the occurrence of mixed-species foraging flocks in fragmented woodland. We discuss the reasons for the discrepancy between our observations of the terrestrial avifauna and previous reports, and the possibility that the Mostardas Peninsula is a passerine migratory route that remains poorly documented.

INTRODUCTION

Lagoa do Peixe National Park (LPNP), located on the seaward side of the Mostardas Peninsula in Rio Grande do Sul, Brazil (Figure 1A) is recognized as being internationally important for migrant shorebirds (Nascimento 1995; Bencke *et al.* 2006); it is a Ramsar site and is highlighted by the Western Hemisphere Shorebird Reserve Network (WHSRN 2009) as one of South America's most outstanding refuges for thousands of long distance migrants. Following Belton's landmark study of the birds of Rio Grande do Sul (Belton 1984, 1985, 1994), Nascimento (1995) documented the occurrence of 181 bird species for LPNP. A further 49 species have been documented as occurring in the park up until 2010 (Lara-Resende and Leeuwenberg 1987; Nascimento unpublished data; Maurício and Bencke 2000; Mohr 2003 as cited in Pereira and Poerschke 2010; Mohr 2004; Mohr *et al.* 2005; Bencke *et al.* 2007; Pereira and Poerschke 2010). This total of 230 is still relatively few species when compared with the total of 661 that have been recorded in the state of Rio Grande do Sul (Bencke *et al.* 2010). Of these 230 species, ~53% are water birds (both marine and freshwater) and the rest (107 species including 16 raptors and owls) are terrestrial birds.

With the majority of interest lying with the wetland birds, there are relatively few reports on the terrestrial birds of the Mostardas Peninsula. Belton (1984) identified the peninsula as being 'interesting because of its paucity of passerine species'. However, he based this assessment on a total of 13 days of survey on the Mostardas Peninsula between 1972-1981 during the months of January, May, July and October (Belton 1985), relatively few periods of observation in a seasonal environment that one would expect to be characterised by the passage of migrants. The low number of species of passerines, hummingbirds and other terrestrial birds reported for the Mostardas Peninsula is surprising. The peninsula may be isolated biogeographically and genuinely have few terrestrial species, however the survey effort has not been extensive, and it is possible that the avifauna is under-sampled.

Here we report observations of birds on the Mostardas Peninsula, notably terrestrial birds in and near the western margins of LPNP. We used rapid assessment methods – '10-species lists' – which are of growing interest as a conservation tool (Roberts *et al.* 2007), our purpose to reassess the species richness of this region of the Mostardas Peninsula. Using this method we document species diversity and abundance of the community of birds in the arboreal and scrubby restingas and flooded forests, and describe mixed-species foraging flocks observed there. Although the marismas (*i.e.* salt marshes) and lagoons of the LPNP were not systematically surveyed as part of the present investigation, we document the shorebirds and waterfowl we observed over the period of study. Finally, we comment on the reasons for the discrepancy between our observations of the avifauna of the Mostardas Peninsula and previous reports, and the likelihood that with further effort the list of birds is likely to increase considerably.

MATERIAL AND METHODS

Our survey focused on an area of ~2 sq km centred on 31°13'12" S, 50°58'12" W, part of a fazenda on the western margin of LPNP (Figure 1A and 1B). The majority of our main survey area was arboreal and scrubby restingas which was consistent with the description in Belton (1984) as comprising 'members of the laurel (Lauracea) and myrtle (Myrtaceae) families and impressively large fig trees (*Ficus* spp.) with enormous spreading branches bearing a spectacular burden of epiphytes'. This habitat runs in a strip (~1 km broad at this point) parallel to the coast and is typical of the once more extensive littoral forest. To the east of this, an escarpment, with an elevation fall from about 15 m to 5 m, marks the western boundary of LPNP and a transition from dry restingas to flooded forest and swamps. Further east are the grazed marismas

and then the lagoon. Water levels on much of this wetland are not controlled by the tides, but instead vary over short time scales with rainfall and changes of wind direction. Areas with *juncos* and sedges are scarce and fragmented, sometimes thin as the result of grazing, and nowhere as expansive as seen at Taim or Pelotas areas further south. To the west of the restingas there is an expanse of sparsely vegetated sandy habitat, susceptible to flood and dotted with invasive *Pinus* species. The western border of the fazenda is formed by the RST101 road that runs the length of the Mostardas Peninsula.

Observations were made between 15 February and 1 March 2007 then again 17 to 24 March 2007. We used rapid assessment methods to evaluate the diversity of birds on 13 of these days; we did not conduct systematic surveys during rainy or windy weather. The marismas were not systematically surveyed as part of this 'rapid assessment', but we report here on our observations of shorebirds and waterfowl, and changes evident over the period of our visit (spanning the end of summer and the beginning of fall migration for many species). In particular we note counts made on 23 March along a 2.2 km transect extending east from the main study area across the grazed marismas to the lagoon.

The rapid assessment method requires the identification of all birds encountered as observers move around a defined study site, using paths where possible (Poulsen *et al.* 1997). We compiled '10-species' lists, identifying all species by sight and sound until a total of 10 different species had been observed and identified, marking the geographic position at the start and the finish of a list using a GPS unit (*Garmin*; see Figure 1B for an example of a typical survey track). After the tenth species had been identified, a new 10-species list was started, with some repetition of birds from the first list, as well as new species. Graphing the 'species accumulation curve' provides an indication of species diversity. The higher the diversity, the more new species will appear in lists through time. Also, the proportion of lists on which a species occurs (List Reporting Rate; LRR) is proportional to its abundance (Roberts *et al.* 2007).

In the field we used a comprehensive selection of guides for the identification of species (Hayman *et al.* 1984; Ridgely and Tudor 1989, 1994; de la Peña and Rumboll 1998; Remold 2001; Mata *et al.* 2006). For a few species we also collected sound recordings (*Edirol* R-09 MP3 recorder with a *Sennheiser* MKH8070 shotgun microphone) for comparison with known songs and calls (*e.g.* internet sites such as Xeno-canto Foundation (2005-2011), and Remold (2001). However, as we did not systematically photograph or collect specimens, any potentially new records for the area can only be considered hypothetical. Taxonomy and nomenclature follows the classification of the Comitê Brasileiro de Registros Ornitológicos (2011).

Fisher's exact tests were used for basic tests of probability. Analyses were carried out using R, version 2.8.1 (R Development Core Team 2008).

Results and Discussion

During the 23 days in which we made observations we documented a total of 165 bird species of which 100 were terrestrial (including 17 raptors and owls). Fourteen species had not been reported previously for the area, and we document a further 31 species whose status is unclear or ambiguous. Our rapid assessment surveys elucidate the status and flocking habits of many forest birds and we also comment on migration through the area.

Rapid assessment (10-species lists). In the survey of restinga and forest habitat we completed a total of 126 '10-species' lists. While completing this systematic survey we observed 94 species (Table 1). From the species accumulation curve we are able to assess whether our survey appears to have documented all species in the study area (Figure 2); if the accumulation curve flattens we can say that no new birds are being found, and our list probably shows the full diversity of birds. In fact we continued to observe new species until the end of the study.

The rapid assessment showed a step in which a number of new birds were observed towards the very end of the survey. This 'step', visible on the species accumulation curve (Figure 2), would appear to reflect the end of summer and onset of fall migration. The Mostardas Peninula has not been identified as an important area for the passage of terrestrial migrants, but our observations, including Yellow-billed Cuckoo *Coccyzus americanus* (Linnaeus,

Figure 1. A. Location of Lagoa do Peixe National Park and this survey's study site. B. Aerial photograph of the study site showing a typical route (small dashed line) taken to collect 10-species lists in relation to the locations of various habitats. The escarpment (large dashed line) marks the western boundary of the national park and the marker (+) indicates the centre of the main study area (31°13'12" S, 50°58'12" W). Habitat is marked on figure: A = arboreal and scrubby restingas; B = scrubby restinga and flooded forest; C = marisma.

1758) and Peregrine Falcon *Falco peregrinus* Tunstall, 1771 in the final 10-species counts were indicative of rare migrants passing through the area. More common species – but not well known for this region were also likely to be migrants, *e.g.* Red-eyed Vireo *Vireo olivaceus* (Linnaeus, 1766) - two individuals observed on the fazenda between 17 February and 1 March.

The List Reporting Rate (LRR) gives an indication of abundance (Table 1; Roberts *et al.* 2007). There is a need for some caution in the interpretation of our 10-species lists in this respect as conspicuous birds may be recorded more frequently and appear commoner than more cryptic species. However, it is noteworthy that 9 of the commoner species (top half of the table, present in 6% or more of the lists) were only recently added to the LPNP list or indeed new for the area. Olive Spinetail *Cranioleuca obsoleta* (Reichenbach, 1853) (on 21% lists) and Turkey Vulture *Cathartes aura* (Linnaeus, 1758) (6%) were additions to the LPNP species list whereas Picazuro Pigeon *Patagioenas picazuro* (Temminck, 1813) (48%), Buff-browed Foliage Gleaner *Syndactyla rufosuperciliata* (Lafresnaye, 1832) (11%), Euler's Flycatcher *Lathrotriccus euleri* (Cabanis, 1868) (9%) and Eared Dove *Zenaida auriculata* (Des Murs, 1847) (6%) were added to the LPNP species list in 2010 (Pereira and Poerschke 2010) and Rufous-browed Peppershrike *Cyclaris gujanensis* (Gmelin, 1789) (42%), Monk Parakeet *Myiopsitta monachus* (Boddaert, 1783) (22%) and Green-barred Woodpecker *Colaptes melanochloros* (Gmelin, 1788) (9%) were added in 1987 (Lara-Resende and Leeuwenberg 1987).

Mixed-species flocks. A number of species in Table 1 are similar in being woodland birds and in their tendency to associate in mixed-species foraging flocks. We identified birds as associating in mixed-species flocks if observed foraging in the same immediate area, and when there was evidence of association in the form of calls and other signals (Hutto 1987; Harrison and Whitehouse 2011). During the rapid assessment we encountered four mixed-species flocks involving a total of 15 species. Five of the species were associated with flocks more than would be expected by chance given their relative occurrence in the four flocks and the remaining 10-species lists. These were Grey-throated Warbling-finch *Poospiza cabanisi* Bonaparte, 1850 (Fisher's exact test; $p = 0.008$), Olive Spinetail ($p = 0.016$), Buff-browed Foliage-gleaner ($p = 0.019$), Swainson's

Table 1. Birds recorded on 126 '10-species' lists. Species are ordered by their abundance as indicated by the number of lists (Total and %) on which they occurred.

SCIENTIFIC NAME	ENGLISH NAME	TOTAL	%
Pitangus sulphuratus (Linnaeus, 1766)	Great Kiskadee	77	61
Zonotrichia capensis (Statius Muller, 1776)	Rufous-collared Sparrow	65	52
Patagioenas picazuro (Temminck, 1813)	Picazuro Pigeon	61	48
Furnarius rufus (Gmelin, 1788)	Rufous Hornero	59	47
Hylocharis chrysura (Shaw, 1812)	Gilded Hummingbird	56	44
Leptotila verreauxi Bonaparte, 1855	White-tipped Dove	56	44
Cyclaris gujanensis (Gmelin, 1789)	Rufous-browed Peppershrike	53	42
Progne tapera (Vieillot, 1817)	Brown-chested Martin	50	40
Turdus rufiventris Vieillot, 1818	Rufous-bellied Thrush	47	37
Turdus amaurochalinus Cabanis, 1850	Creamy-bellied Thrush	37	29
Tyrannus melancholicus Vieillot, 1819	Tropical Kingbird	32	25
Myiopsitta monachus (Boddaert, 1783)	Monk Parakeet	28	22
Basileuterus leucoblepharus (Vieillot, 1817)	White-browed Warbler	28	22
Cranioleuca obsoleta (Reichenbach, 1853)	Olive Spinetail	27	21
Stephanophorus diadematus (Temminck, 1823)	Diademed Tanager	24	19
Vanellus chilensis (Molina, 1782)	Southern Lapwing	24	19
Basileuterus culicivorus (Deppe, 1830)	Golden-crowned Warbler	23	18
Coereba flaveola (Linnaeus, 1758)	Bananaquit	22	17
Sicalis flaveola (Linnaeus, 1766)	Saffron Finch	22	17
Synallaxis spixi Sclater, 1856	Spix's Spinetail	21	17
Columbina picui (Temminck, 1813)	Picui Ground-Dove	21	17
Xolmis irupero (Vieillot, 1823)	White Monjita	21	17
Pipraeidea bonariensis (Gmelin, 1789)	Blue-and-yellow Tanager	20	16
Poospiza cabanisi Bonaparte 1850	Grey-throated Warbling-Finch	18	14
Elaenia obscura (d'Orbigny and Lafresnaye, 1837)	Highland Elaenia	17	13
Agelaioides badius (Vieillot, 1819)	Bay-winged Cowbird	16	13
Tangara sayaca (Linnaeus, 1766)	Sayaca Tanager	16	13
Myiophobus fasciatus (Statius Muller, 1776)	Bran-colored Flycatcher	15	12
Rupornis magnirostris (Gmelin, 1788)	Roadside Hawk	15	12
Parula pitiayumi (Vieillot, 1817)	Tropical Parula	15	12
Syndactyla rufosuperciliata (Lafresnaye, 1832)	Buff-browed Foliage-gleaner	14	11
Hirundo rustica Linnaeus, 1758	Barn Swallow	12	10
Lathrotriccus euleri (Cabanis, 1868)	Euler's Flycatcher	11	9
Colaptes melanochloros (Gmelin, 1788)	Green-barred Woodpecker	11	9
Sturnella superciliaris (Bonaparte, 1850)	White-browed Blackbird	11	9

Table 1. ***Continued.***

SCIENTIFIC NAME	ENGLISH NAME	TOTAL	%
Anumbius annumbi (Vieillot, 1817)	Firewood-gatherer	10	8
Guira guira (Gmelin, 1788)	Guira Cuckoo	10	8
Sporophila caerulescens (Vieillot, 1823)	Double-collared Seedeater	8	6
Troglodytes musculus Naumann, 1823	Southern House Wren	8	6
Cathartes aura (Linnaeus, 1758)	Turkey Vulture	8	6
Plegadis chihi (Vieillot, 1817)	White-faced Ibis	8	6
Colaptes campestris (Vieillot, 1818)	Campo Flicker	7	6
Zenaida auriculata (Des Murs, 1847)	Eared Dove	7	6
Columbina talpacoti (Temminck, 1811)	Ruddy Ground-Dove	7	6
Serpophaga subcristata (Vieillot, 1817)	White-crested Tyrannulet	7	6
Turdus albicollis Vieillot, 1818	White-necked Thrush	7	6
Machetornis rixosa (Vieillot, 1819)	Cattle Tyrant	6	5
Geothlypis aequinoctialis (Gmelin, 1789)	Masked Yellowthroat	6	5
Caracara plancus (Miller, 1777)	Southern Caracara	6	5
Myiarchus swainsoni Cabanis and Heine, 1859	Swainson's Flycatcher	6	5
Milvago chimango (Vieillot, 1816)	Chimango Caracara	5	4
Phacellodomus ferrugineigula (Pelzeln, 1858)	Orange-breasted Thornbird	5	4
Elaenia parvirostris Pelzeln, 1868	Small-billed Elaenia	5	4
Cyanoloxia brissonii (Lichtenstein, 1823)	Ultramarine Grosbeak	5	4
Falco sparverius Linnaeus, 1758	American Kestrel	4	3
Mimus saturninus (Lichtenstein, 1823)	Chalk-browed Mockingbird	4	3
Icterus pyrrhopterus (Vieillot, 1819)	Variable Oriole	4	3
Thamnophilus ruficapillus Vieillot, 1816	Rufous-capped Antshrike	4	3
Egretta thula (Molina, 1782)	Snowy Egret	4	3
Coragyps atratus (Bechstein, 1793)	Black Vulture	3	2
Amazonetta brasiliensis (Gmelin, 1789)	Brazilian Teal	3	2
Aramides ypecaha (Vieillot, 1819)	Giant Wood-Rail	3	2
Gallinago paraguaiae (Vieillot, 1816)	South American Snipe	3	2
Chauna torquata (Oken, 1816)	Southern Screamer	3	2
Anas georgica Gmelin, 1789	Yellow-billed Pintail	3	2
Satrapa icterophrys (Vieillot, 1818)	Yellow-browed Tyrant	3	2
Pygochelidon cyanoleuca (Vieillot, 1817)	Blue-and-white Swallow	2	2
Bubulcus ibis (Linnaeus, 1758)	Cattle Egret	2	2
Polioptila dumicola (Vieillot, 1817)	Masked Gnatcatcher	2	2
Vireo olivaceus (Linnaeus, 1766)	Red-eyed Vireo	2	2
Heterospizias meridionalis (Latham, 1790)	Savanna Hawk	2	2
Molothrus bonariensis (Gmelin, 1789)	Shiny Cowbird	2	2
Tapera naevia (Linnaeus, 1766)	Striped Cuckoo	2	2
Syrigma sibilatrix (Temminck, 1824)	Whistling Heron	2	2
Chloroceryle amazona (Latham, 1790)	Amazon Kingfisher	1	1
Falco femoralis Temminck, 1822	Aplomado Falcon	1	1
Cygnus melancoryphus (Molina, 1782)	Black-necked Swan	1	1
Pseudoleistes virescens (Vieillot, 1819)	Brown-and-yellow Marshbird	1	1
Tryngites subruficollis (Vieillot, 1819)	Buff-breasted Sandpiper	1	1
Tyrannus savanna Vieillot, 1808	Fork-tailed Flycatcher	1	1
Aramides cajanea (Statius Muller, 1776)	Gray-necked Wood-Rail	1	1
Ardea alba Linnaeus, 1758	Great Egret	1	1
Bubo virginianus (Gmelin, 1788)	Great Horned Owl	1	1
Saltator similis d'Orbigny and Lafresnaye, 1837	Green-winged Saltator	1	1
Falco peregrinus Tunstall, 1771	Peregrine Falcon	1	1
Pardirallus sanguinolentus (Swainson, 1837)	Plumbeous Rail	1	1
Laterallus leucopyrrhus (Vieillot, 1819)	Red-and-white Crake	1	1
Lanio cucullatus (Statius Muller, 1776)	Red-crested Finch	1	1
Megaceryle torquata (Linnaeus, 1766)	Ringed Kingfisher	1	1
Accipiter striatus Vieillot, 1808	Sharp-shinned Hawk	1	1
Hymenops perspicillatus (Gmelin, 1789)	Spectacled Tyrant	1	1
Piaya cayana (Linnaeus, 1766)	Squirrel Cuckoo	1	1
Tachycineta leucorrhoa (Vieillot, 1817)	White-rumped Swallow	1	1
Coccyzus americanus (Linnaeus, 1758)	Yellow-billed Cuckoo	1	1

Flycatcher *Myiarchus swainsoni* Cabanis and Heine, 1859 (p = 0.006) and Euler's Flycatcher (p = 0.007). The mixed-species flocks appeared to be led by Olive Spinetails and conspicuous family parties of Grey-throated Warbling-finches which were present in all observed flocks. Other species observed associated with one or more of the four flocks were Rufous-browed Peppershrike (4 flocks, p = 0.069), Golden-crowned Warbler *Basileuterus culicivorus* (Deppe, 1830) (3 flocks, p = 0.087), White-browed Warbler *Basileuterus leucoblepharus* (Vieillot, 1817) (2 flocks), Rufous-collared Sparrow *Zonotrichia capensis* (Statius Muller, 1776) (2 flocks), Rufous-bellied Thrush *Turdus rufiventris* Vieillot, 1818 (2 flocks), and in one flock each Bananaquit *Coereba flaveola* (Linnaeus, 1758), Tropical Parula *Parula pitiayumi* (Vieillot, 1817), Creamy-bellied Thrush *Turdus amaurochalinus* Cabanis, 1850, Diademed Tanager *Stephanophorus diadematus* (Temminck, 1823), and Green-barred Woodpecker.

Species accounts. Other species we observed have either not been recorded previously in the area or their status is not well known (Belton 1984, 1985, 1994; Nascimento 1995; Lara-Resende and Leeuwenberg 1987; Nascimento unpublished data; Maurício and Bencke 2000; Mohr 2003 as cited in Pereira and Poerschke 2010, Mohr 2004; Mohr *et al.* 2005; Bencke *et al.* 2007; Pereira and Poerschke 2010). For instance, we encountered numerous raptors some of which we believe represent new records for the area and others that had been added only recently to the LPNP list (Pereira and Poerschke 2010). Shorebirds were ubiquitous on the wet habitats between the escarpment and the lagoon and again, we observed some species that have not been recorded previously for LPNP while the numbers of others observed are noteworthy.

Species for which we have found no previous records for the area include the following.

Turkey Vulture *Cathartes aura*. Fairly common in groups of up to 5-6 at a time, including within LPNP. This easily identifed, conspicuous species is absent from previous surveys so perhaps there has been a recent range extension.

Sharp-shinned Hawk *Accipiter striatus* Vieillot, 1808. An adult bird was seen 18 February foraging in pines in the sandy area to the west of the fazenda within 1 km of LPNP.

Great Black-Hawk *Urubitinga urubitinga* (Gmelin, 1788). An individual was seen 17 March. Initially the bird was perched on a fence post along the RST101 road adjacent to the study site prior to flying over LPNP.

Red-and-white Crake *Laterallus leucopyrrhus* (Vieillot, 1819). This species was first observed at close range (within 3 m) 28 February feeding around a log in a water-filled ditch at the foot of the escarpment within LPNP. The adult was unmistakable, with distinctive rufous, black and white plumage and bright red legs and was accompanied by 4 large young (nearly adult size) in dark juvenile plumage. An adult vocalized (and was recorded) at the same location on 23 March in response to playback of its trilling vocalization. Red-and-white Crakes have been found further south (Maurício and Dias 1996), however this may be the first breeding record for the Mostardas Peninsula.

Spotted Sandpiper *Actitis macularius* (Linnaeus, 1766). The WHSRN (2009) list Spotted Sandpiper as occurring in very low numbers yet it is missing from published accounts of wader migration through the region. We observed one spotted sandpiper at close range within LPNP feeding in marismas on 24 February.

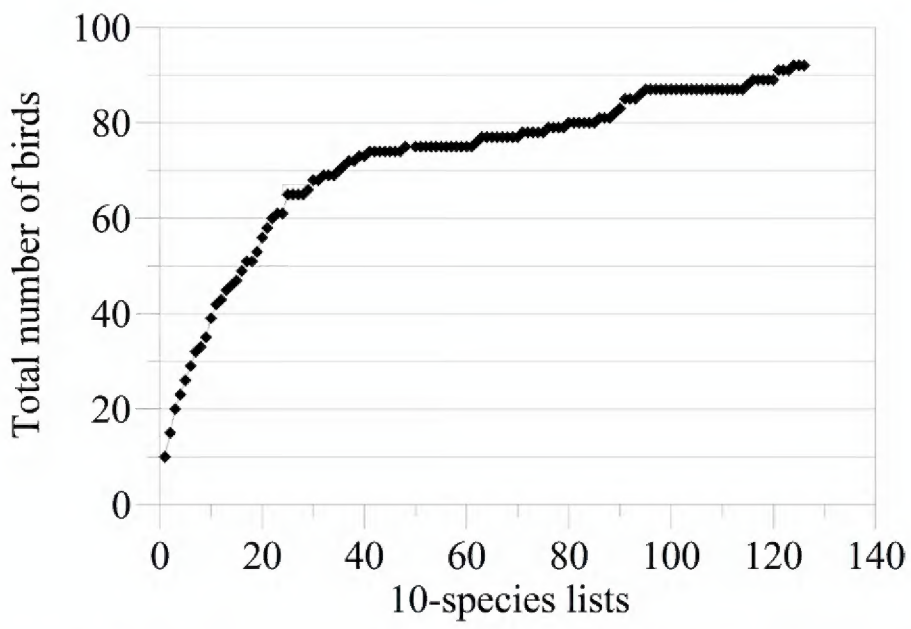

FIGURE 2. The species accumulation curve of total bird species recorded against the number of 10-species lists collected.

TABLE 2. Birds recorded in mixed-species flocks during the collection of 126 10-species lists. Species are ordered by the number of lists in which they occurred (Total), but their propensity to occur in flocks is indicated by the proportion of observations recorded in a flock (%).

SCIENTIFIC NAME	ENGLISH NAME	TOTAL	%
Cranioleuca obsoleta (Reichenbach, 1853)	Olive Spinetail	7	26
Cyclaris gujanensis (Gmelin, 1789)	Rufous-browed Peppershrike	5	9
Syndactyla rufosuperciliata (Lafresnaye, 1832)	Buff-browed Foliage-gleaner	4	29
Zonotrichia capensis (Statius Muller, 1776)	Rufous-collared Sparrow	4	6
Poospiza cabanisi Bonaparte 1850	Grey-throated Warbling-Finch	4	22
Lathrotriccus euleri (Cabanis, 1868)	Euler's Flycatcher	3	27
Myiarchus swainsoni Cabanis and Heine, 1859	Swainson's Flycatcher	3	50
Basileuterus culicivorus (Deppe, 1830)	Golden-crowned Warbler	3	13
Turdus rufiventris Vieillot, 1818	Rufous-bellied Thrush	2	4
Coereba flaveola (Linnaeus, 1758)	Bananaquit	2	9
Parula pitiayumi (Vieillot, 1817)	Tropical Parula	2	13
Basileuterus leucoblepharus (Vieillot, 1817)	White-browed Warbler	2	7
Colaptes melanochloros (Gmelin, 1788)	Green-barred Woodpecker	1	9
Turdus amaurochalinus Cabanis, 1850	Creamy-bellied Thrush	1	3
Stephanophorus diadematus (Temminck, 1823)	Diademed Tanager	1	4

Solitary Sandpiper *Tringa solitaria* Wilson, 1813. We observed Solitary Sandpipers on 15-17 February and again 21-22 February in LPNP.

Olive Spinetail *Cranioleuca obsoleta*. Olive Spinetails were abundant in arboreal and scrubby restingas (including appropriate habitat within LPNP), often with (and apparently leading) mixed-species flocks. All observations were consistent with this species, with no evidence of *C. pyrrhophia* (Vieillot, 1818) or hybrids between the two species as reported farther south by Claramunt (2002).

Small-billed Elaenia *Elaenia parvirostris* Pelzeln, 1868. Small-billed Elaenias were found between 19-24 February and again 21-23 March. On one occasion what appeared to be a family party were active in a fruiting tree within LPNP allowing close examination. Time of year, habitat, and the presence of a coronal stripe and 3 wing-bars on several birds, are indicative of this species rather than any of its congeners.

White-crested Tyrannulet *Serpophaga subcristata* (Vieillot, 1817). White-crested Tyrannulets were observed on 23 and 28 February, on the former date in arboreal restinga and on the latter in an isolated bamboo patch within LPNP.

Swainson's Flycatcher *Myiarchus swainsoni*. We observed this species repeatedly (including appropriate habitat within LPNP) between 17 Feb and 23 March, closely associated with mixed-species flocks.

Red-eyed Vireo *Vireo olivaceus*. Two individuals were observed within LPNP between 17 February and 1 March.

Ultramarine Grosbeak *Cyanoloxia brissonii* (Lichtenstein, 1823). A few, relatively large dark blue grosbeaks were observed repeatedly on the fazenda within 1 km of LPNP and identified as *C. brissonii* rather than the smaller Glaucous-blue Grosbeak *Cyanoloxia glaucocaerulea* (d'Orbigny and Lafresnaye, 1837). Furthermore, several birds were moulting from juvenile into adult male plumage, suggesting possible breeding nearby.

Variable Oriole *Icterus pyrrhopterus* (Vieillot, 1819). This species, previously considered conspecific with Epaulet Oriole *I. cayanensis* (Linnaeus, 1766), was seen regularly in restinga along the escarpment at the margin of LPNP, on 17, 19 and 28 February, despite Belton's (1985) distribution map suggesting they were at the edge of their range.

Screaming Cowbird *Molothrus rufoaxillaris* (Cassin, 1866). Screaming Cowbirds were abundant and conspicuous in open areas within 1 km of LPNP. This is a brood parasite dependent on Bay-winged Cowbirds *Agelaioides badius* (Vieillot, 1819) to raise their young; we watched many families of Bay-winged Cowbirds with their Screaming Cowbird offspring moulting out of their juvenile plumage which mimics that of their host (Ridgely and Tudor 1989).

Other noteworthy observations. Although recorded previously for the LPNP, we add our own observations of some species to help clarify their status.

Greater Rhea *Rhea americana* (Linnaeus, 1758). Added relatively recently to the LPNP list (Pereira and Poerschke 2010), small flocks of 6-8 Rheas were frequently seen on the grazed marismas.

Spotted Nothura *Nothura maculosa* (Temminck, 1815). A few individuals were seen crossing the fazenda tracks.

Cattle Egret *Bubulcus ibis* (Linnaeus, 1758). Added recently to the park list (Mohr 2003 as cited in Pereira and Poerschke 2010), this species was common, feeding with livestock on grazed marismas.

Whistling Heron *Syrigma sibilatrix* (Temminck, 1824). Individuals seen on several occasions in wet scrub near the fazenda.

Long-winged Harrier *Circus buffoni* (Gmelin, 1788). Individuals were encountered repeatedly and appeared to be LPNP residents.

Aplomado Falcon *Falco femoralis* Temminck, 1822. Seen on 3 occasions in LPNP.

Peregrine Falcon *Falco peregrinus*. Seen from the fazenda 23 March, at least 2 birds flying high and moving to the north along the escarpment.

Giant Wood-Rail *Aramides ypecaha* (Vieillot, 1819). Individuals were found at the base of the escarpment; this species was absent from early descriptions of the birds of the peninsula, but documented recently as occurring in LPNP (Bencke *et al.* 2007).

American Golden Plover *Pluvialis dominica* (Statius Muller, 1776). Numbers of this species dropped during our survey; 100's were observed feeding among Southern Lapwings *Vanellus chilensis* (Molina, 1782) and Buff-breasted Sandpiper *Tryngites subruficollis* (Vieillot, 1819) on marginally higher grazed marismas in the last two weeks of February. However, between March 18-23 few were observed with just 4 on 23 March.

Two-banded Plover *Charadrius falklandicus* Latham, 1790. Small numbers were observed including adults in breeding plumage with juveniles on 21 February. Although capable of flight the presence of juveniles on this date indicates breeding at LPNP (see Belton 1994).

Dowitcher (*Limnodromus* sp.). On 24 Feb, a greyish, long-billed shorebird was observed briefly and identified as *Limnodromus* by NMH and MJW based on our previous experience with the genus. It fed on flooded marismas with *Tringa* for structural comparison, but neither sufficient plumage detail or call were obtained to identify the bird to species. *Limnodromus griseus* (Gmelin, 1789) is the only species in the genus with documented records in the state (Bencke *et al.* 2010).

Ruddy Turnstones *Arenaria interpres* (Linnaeus, 1758). Observed on flooded marismas 19-20 March.

White-rumped Sandpiper *Calidris fuscicollis* (Vieillot, 1819). Abundant in mid-March on flooded marismas with a count of 335 on 23 March.

Buff-breasted Sandpiper *Tryngites subruficollis*. Abundant on marginally higher ground in flooded marismas from 17 Feb to 23 March. A count of 2106 on 23 March.

South American Painted-Snipe *Nycticryphes semicollaris* (Vieillot, 1816). There are relatively few records of this distinctive and easily recognizable species in Rio Grande do Sul (Maurício and Dias 1996); according to Belton (1984, 1994) it is rare on the Mostardas Peninsula and it has been added relatively recently to the LPNP list (Nascimento, unpublished record). Our observation on 4 February of >20 feeding among the *juncos* (low thickets of rushes) in

the marismas is likely to be an exceptional record.

Olrog's Gull *Larus atlanticus* Olrog, 1958. A single bird was observed on the shoreline of Lagoa do Peixe on 20 March.

Picazuro Pigeon *Patagioenas picazuro* (Temminck, 1813). Added only recently to the LPNP list (Pereira and Poerschke 2010), in agreement with these authors we found it abundant.

Eared Dove *Zenaida auriculata*. As with Picazuro Pigeon (Pereira and Poerschke 2010), an abundant species.

Monk Parakeet *Myiopsitta monachus*. First noted by Lara-Resende and Leeuwenberg (1987) this species was encountered frequently.

Yellow-billed Cuckoo *Coccyzus americanus*. Excellent views were obtained of an individual showing the diagnostic plumage traits of this species on the fazenda within 1 km of LPNP, on 21 March. Previously recorded by Fedrizzi and Carlos (2011).

Great Horned Owl *Bubo virginianus* (Gmelin, 1788). Heard repeatedly around the fazenda and found roosting in a small patch of trees in flooded marisma.

Scissor-tailed Nightjar *Hydropsalis torquata* (Gmelin, 1789). Added recently to the LPNP (Bencke *et al.* 2007), a specimen was found dead on the road into the fazenda and several living birds seen on the property 21-23 March.

Nacunda Nighthawk *Chordeiles nacunda* (Vieillot, 1817). A specimen was found dead on the RST101 road adjacent to the fazenda on 21 February.

Green-barred Woodpecker *Colaptes melanochloros*. Added to the LPNP list by Lara-Resende and Leeuwenberg (1987), we encountered this species regularly around the fazenda.

Orange-breasted Thornbird *Phacellodomus ferrugineigula* (Pelzeln, 1858). Described as uncommon in the state, Belton (1984) described this species as 'probably resident but not registered in December, or March-May'. Previously this species was treated as a conspecific with *P. erythrophthalmus* (Wied, 1821); all of our observations and sound recordings (good vocal records for 6 individuals) were consistent with *P. ferrugineigula* (Simon *et al.* 2008) as would be expected. We found a minimum of 12 birds, between 17 February and 23 March 2007, restricted to dense flooded vegetation, apparently occupying all suitable habitats along 2.6 km of the western boundary of LPNP.

Buff-browed Foliage-gleaner *Syndactyla rufosuperciliata*. Added recently to the LPNP list (Pereira and Poerschke 2010), this species was regularly seen in arboreal and scrubby restingas.

Euler's Flycatcher *Lathrotriccus euleri*. Another recent addition to the Mostardas Peninsula and LPNP list (Maurício and Bencke 2000; Pereira and Poerschke 2010), we found them regularly between 17 February and 1 March in arboreal and scrubby restingas, feeding low, usually with mixed-species flocks.

Rusty-collared Seedeater *Sporophila collaris* (Boddaert, 1783). First noted for LPNP by Nascimento (1995), this species occurs further south than originally described by Belton (1985).

Green-winged Saltator *Saltator similis* d'Orbigny and Lafresnaye, 1837. A recent addition to the Mostardas Peninsula and LPNP list (Bencke *et al.* 2007; Pereira and Poerschke 2010), we observed 2 on separate occasions on the fazenda, 17 February and 1 March.

Masked Yellowthroat *Geothlypis aequinoctialis* (Gmelin, 1789). Added to the LPNP list by Lara-Resende and Leeuwenberg (1987), this species was found repeatedly in swampy margins.

Rufous-browed Peppershrike *Cyclaris gujanensis*. Added to the LPNP list by Lara-Resende and Leeuwenberg (1987), this species was fairly abundant around the fazenda.

In this relatively short survey we observed more species than expected, including 14 which represent hypothetically new records for the area, most within LPNP. Furthermore, our observations suggest some species previously unrecorded in the region are in fact common residents or migrants (Belton 1984, 1985, 1994; Nascimento 1995; Lara-Resende and Leeuwenberg 1987; Nascimento, unpublished data; Maurício and Bencke 2000; Mohr 2003 as cited in Pereira and Poerschke 2010, Mohr 2004; Mohr *et al.* 2005; Bencke *et al.* 2007; Pereira and Poerschke 2010). Such coastal sites as the Mostardas Peninsula are often areas with high diversity because of the passage of migrants. While LPNP is established as an important migratory stop-over for shorebirds, the records of terrestrial migrants were not expected. The patchwork of forest fragments extend in a belt with a north-south orientation, and this may be acting as a corridor for terrestrial migrants.

The sequence of reports (noted above) on the Mostardas avifauna indicates that Belton's assessment of the primary interest at the site as being the 'paucity of birds' is not supported. The reports since Belton's original work (1984, 1985) have each introduced new species, but it would appear that the terrestrial habitat is not easily evaluated, and that the rhythm of movements by terrestrial migrants has not yet been described adequately. Our rising species accumulation curve, and more generally the increasing species list for the Mostardas Peninsula suggests that we continue to be in an exploratory phase in describing this avifauna, consistent with the observation by Bencke (2001) and Bencke *et al.* (2010) for the state of Rio Grande do Sul as a whole. It is likely that many more species could be added to the LPNP list relatively easily with more diverse observer effort (*e.g.* during all seasons and habitats). However, some of our more unusual records suggest that other unexpected migrants are also likely to be added to the list.

Given the amount of effort that has been spent previously studying the waterbirds and shorebirds of LPNP, most of our observations are likely to be unremarkable. However, the exceptions to this are likely to be the breeding record for Red-and-white Crake and the occurrence of rarities such as Spotted and Solitary Sandpipers. It is unfortunate that we were unable to identify to species the vagrant Dowitcher species we found at the lagoon, feeding with Yellowlegs (*Tringa* spp.) on 24 February. However it is most likely to have been Short-billed Dowitcher *Limnodromus griseus* (Harrington *et al.* 1986; Bencke *et al.* 2010). Also noteworthy were the 20 or so South American Painted-Snipes that we found on 4 February. The specific *juncos* habitat in which the birds were located and its

susceptibility to flooding/drying out may account for their irregular occurrence in the LPNP (Belton 1984, 1994). Finally, the abundance of Buff-breasted Sandpipers during our study period was striking; on a single count along a transect between the escarpment and the lagoon on 23 March we counted 2106 individuals which represents a substantial part of this species' global population (Lanctot *et al.* 2010). Although LPNP is renowned for the large numbers of migrant and wintering shorebirds, our observations indicate that the documented numbers may be underestimates for a number of species.

As far as some of the more noticeable new terrestrial birds (*e.g.* Turkey Vulture and Screaming Cowbird) we observed in or near LPNP, these may be well known in the park but not have entered the scientific literature; or they may represent genuinely new range extensions. The occurrence of others (*e.g.* Sharp-shinned Hawk and Great Black-Hawk) may be due purely to serendipity. However, some of our observations in the arboreal and scrubby restingas may have resulted from us having had the opportunity to survey a high quality habitat remnant. The highly fragmented habitat on the Mostardas Peninusla may in part explain the extent to which terrestrial birds have not previously been well documented. The majority of woodland birds were observed in an area of littoral forest, characterized by mature fig trees (*Ficus*). Belton (1985, 1994) noted that the absence of species such as Swainson's Flycatcher on the Mostardas Peninsula was probably because of the absence of suitable woodland habitat. In fragmented woodland habitat there may be a loss of mixed-species flocks, as has been reported in the Atlantic Forest of Brazil (Maldonado-Coelho and Marini 2003), and given its association with such flocks, Swainson's Flycatcher may be particularly scarce in fragmented woodland.

The habitat of the Mostardas Peninsula would appear to be harsh and inhospitable, dominated by expansive dunes, with the wetland of Lagoa do Peixe offering a very specific type of habitat for shorebirds and waterfowl. Our observations suggest that there are pockets of habitat that may hold more species than presently on record. Even with additions, the regional bird list for the Mostardas Peninsula will be small when compared with the total of 661 that have been recorded in the state of Rio Grande do Sul (Bencke *et al.* 2010) but it represents an interesting region in biogeographic terms, and as an 'edge of range' community is important in terms of conservation. Some of the species we observed, such as Red-eyed Vireo (17 and 24 February) and Yellow-billed Cuckoo (23 March) are migrants, and the potential importance of the Mostardas Peninsula for terrestrial migrant birds merits further study. We argue here that there is need for further survey effort, particularly during spring and fall migration, with a programme of mist-netting potentially identifying this as an important migratory route for a variety of taxa.

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